ABSTRACT

An apparatus for thermal conversion of one or more reactants to desired end products includes an insulated reactor chamber having a high temperature heater such as a plasma torch at its inlet end and, optionally, a restrictive convergent-divergent nozzle at its outlet end. In a thermal conversion method, reactants are injected upstream from the reactor chamber and thoroughly mixed with the plasma stream before entering the reactor chamber. The reactor chamber has a reaction zone that is maintained at a substantially uniform temperature. The resulting heated gaseous stream is then rapidly cooled by passage through the nozzle, which "freezes" the desired end product(s) in the heated equilibrium reaction stage, or is discharged through an outlet pipe without the convergent-divergent nozzle . The desired end products are then separated from the gaseous stream.